US012054313B2

(12) **United States Patent**
Frankenberg

(10) **Patent No.: US 12,054,313 B2**
(45) **Date of Patent: Aug. 6, 2024**

(54) **TOTE WITH SIDE WALL DRAIN HOLES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/063,838**

(22) Filed: **Dec. 9, 2022**

(65) **Prior Publication Data**

US 2023/0182963 A1 Jun. 15, 2023

Related U.S. Application Data

(60) Provisional application No. 63/265,598, filed on Dec. 17, 2021, provisional application No. 63/265,452, filed on Dec. 15, 2021.

(51) **Int. Cl.**
B65D 25/38 (2006.01)
B65D 25/08 (2006.01)

(52) **U.S. Cl.**
CPC ***B65D 25/38*** (2013.01); ***B65D 25/08*** (2013.01)

(58) **Field of Classification Search**
CPC B65D 1/243; B65D 25/04; B65D 25/08; B65D 25/38; B65D 81/261
See application file for complete search history.

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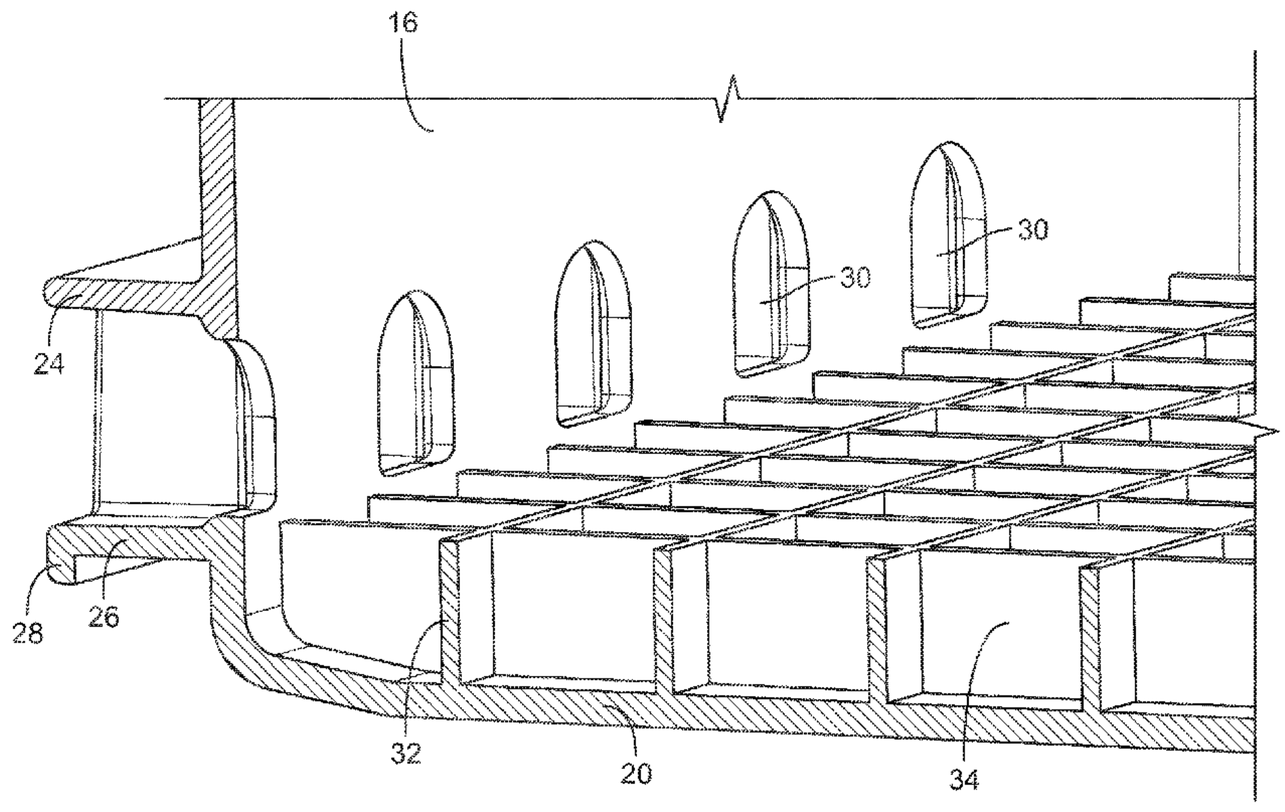
(57) **ABSTRACT**

A tote with a drainage system for evenly distributing water through all four sides is provided. The tote includes a first end wall, a second opposing end wall, a first side wall, a second opposing side wall, and a bottom wall. A bumper extends outward around the periphery of the tote. A plurality of D-shaped drain holes are positioned a first distance above the upper surface of the bottom wall which allow liquid in the tote to drain evenly out of the tote through the bumper.

20 Claims, 9 Drawing Sheets



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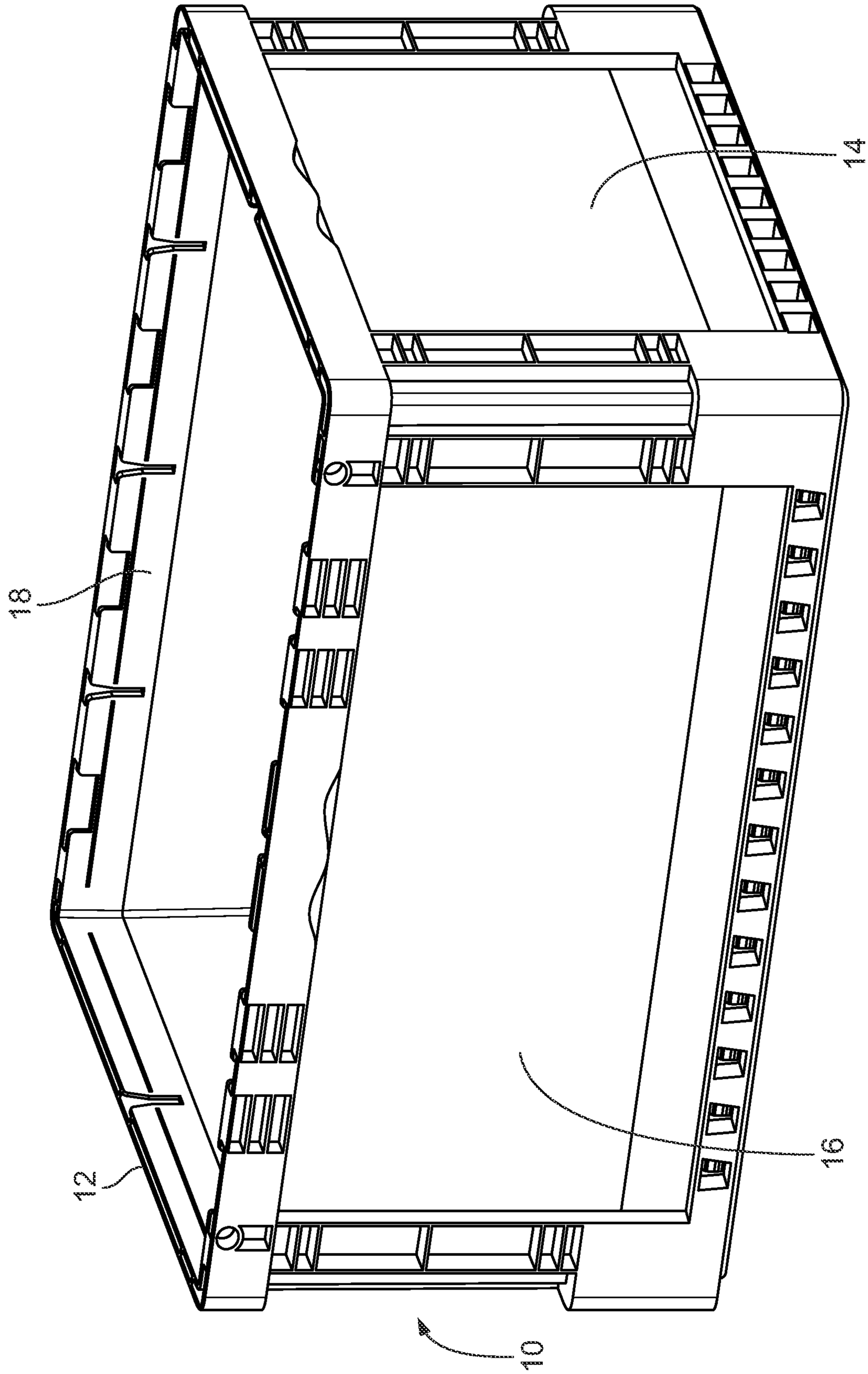


FIG. 1

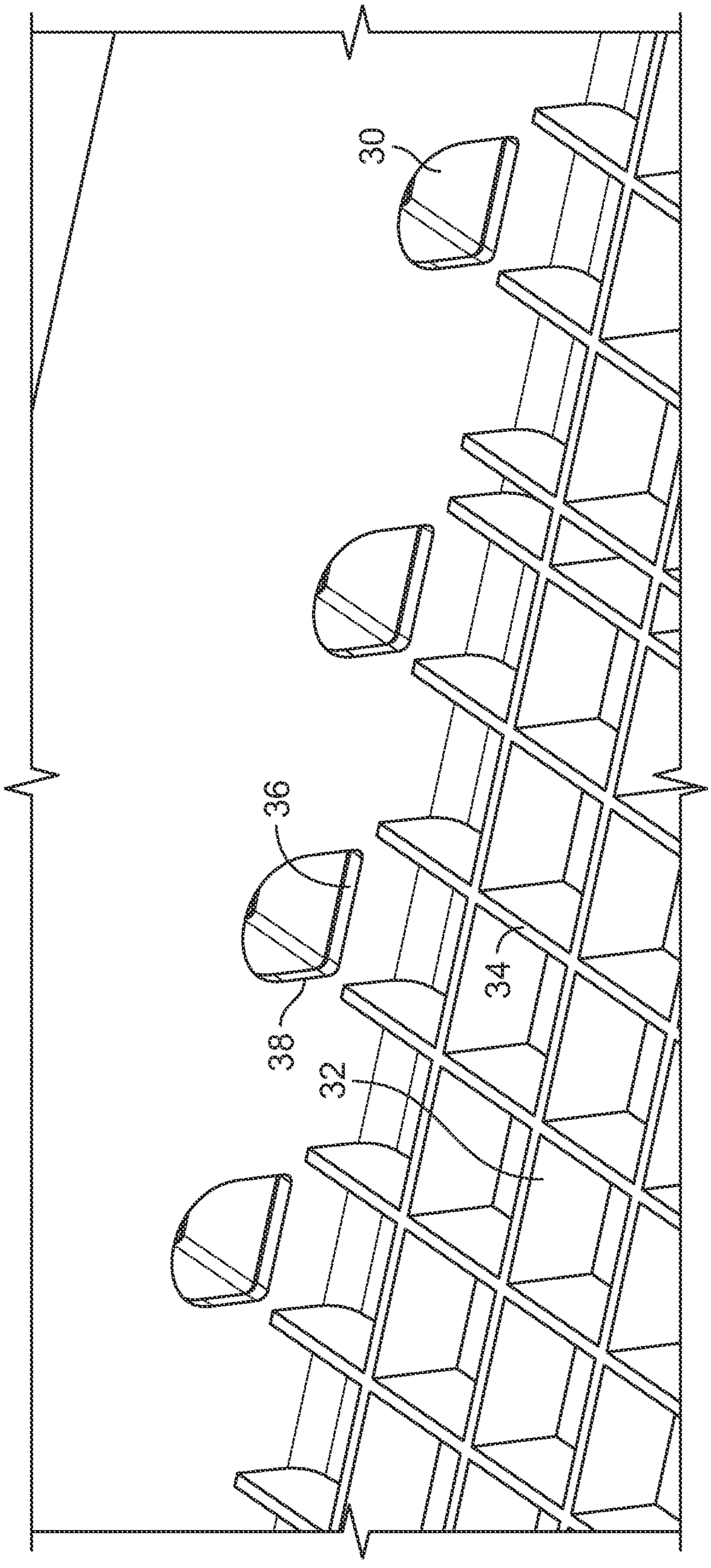
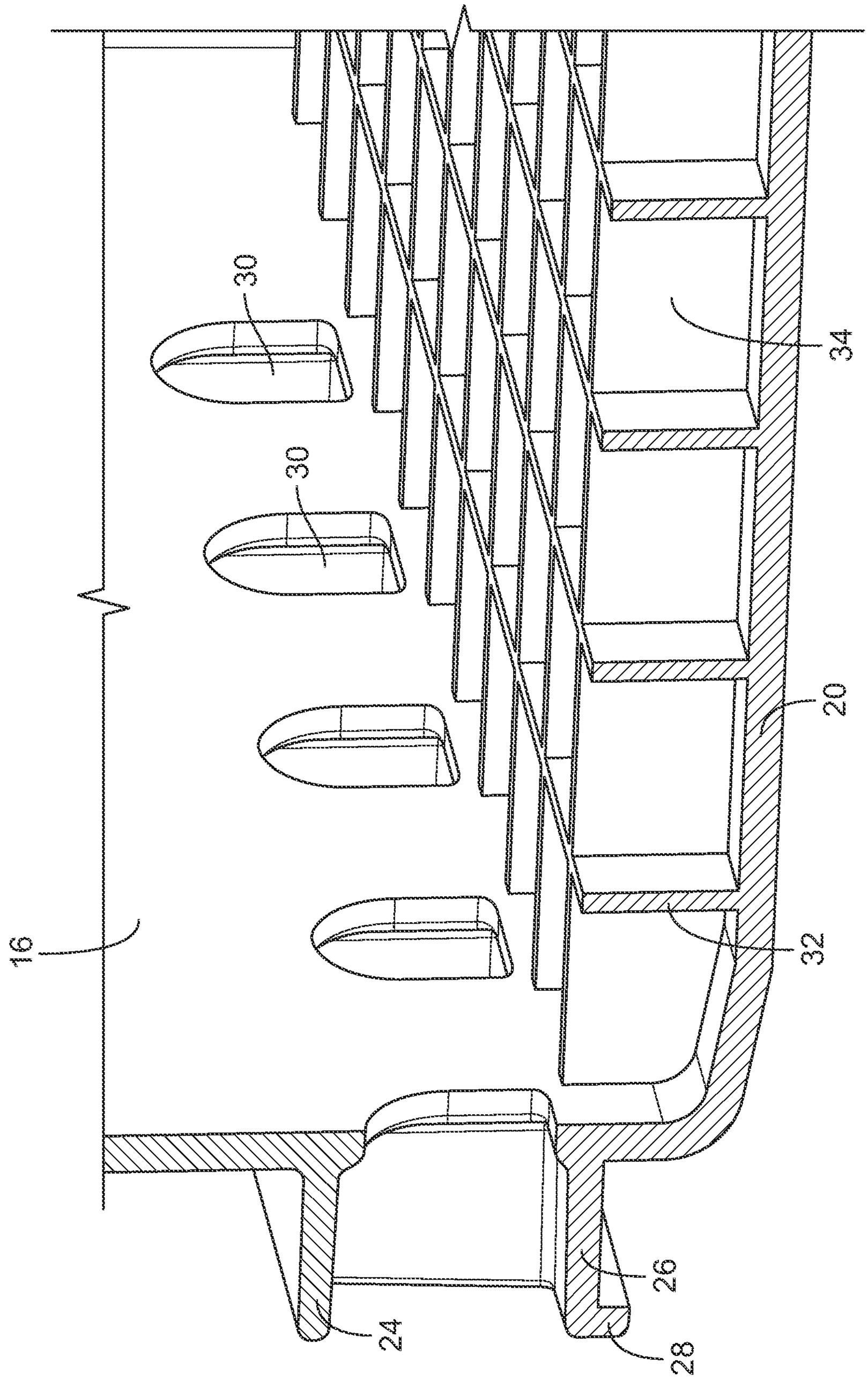


FIG. 2



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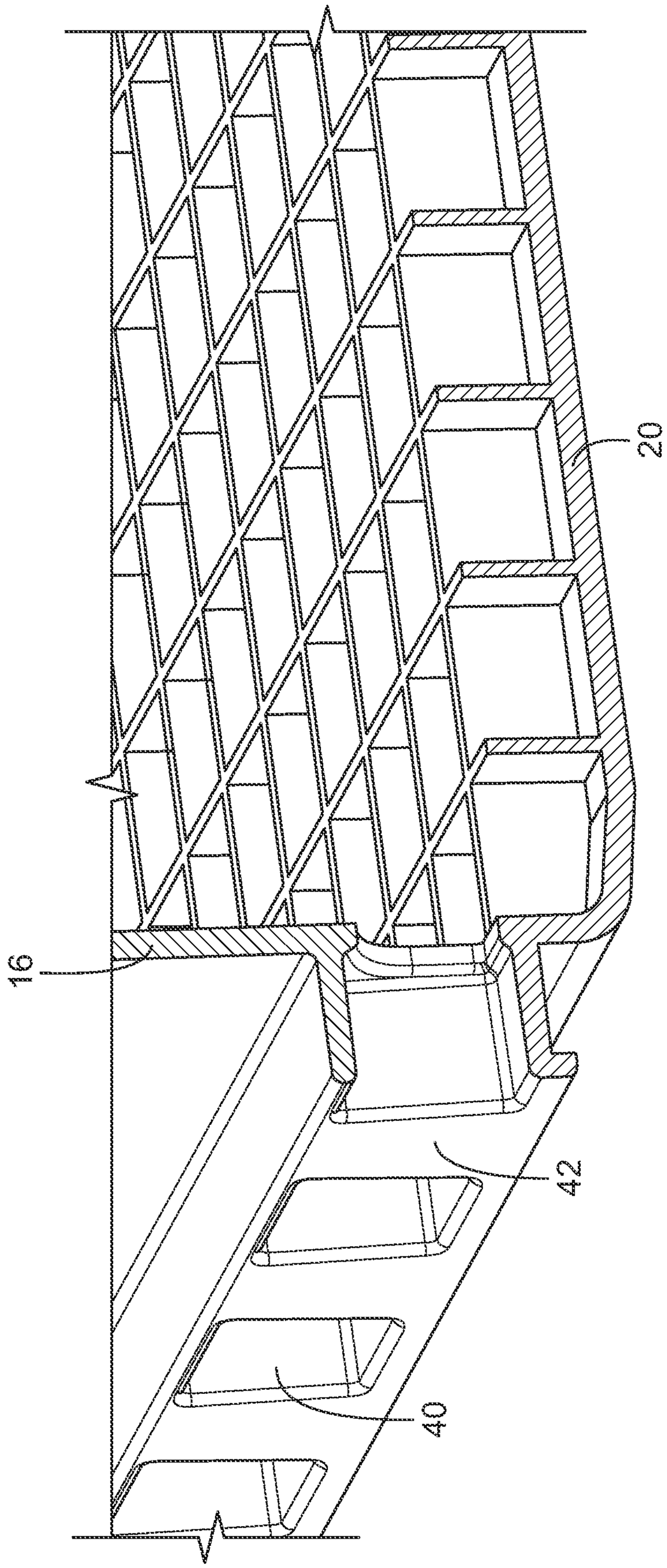

FIG. 4

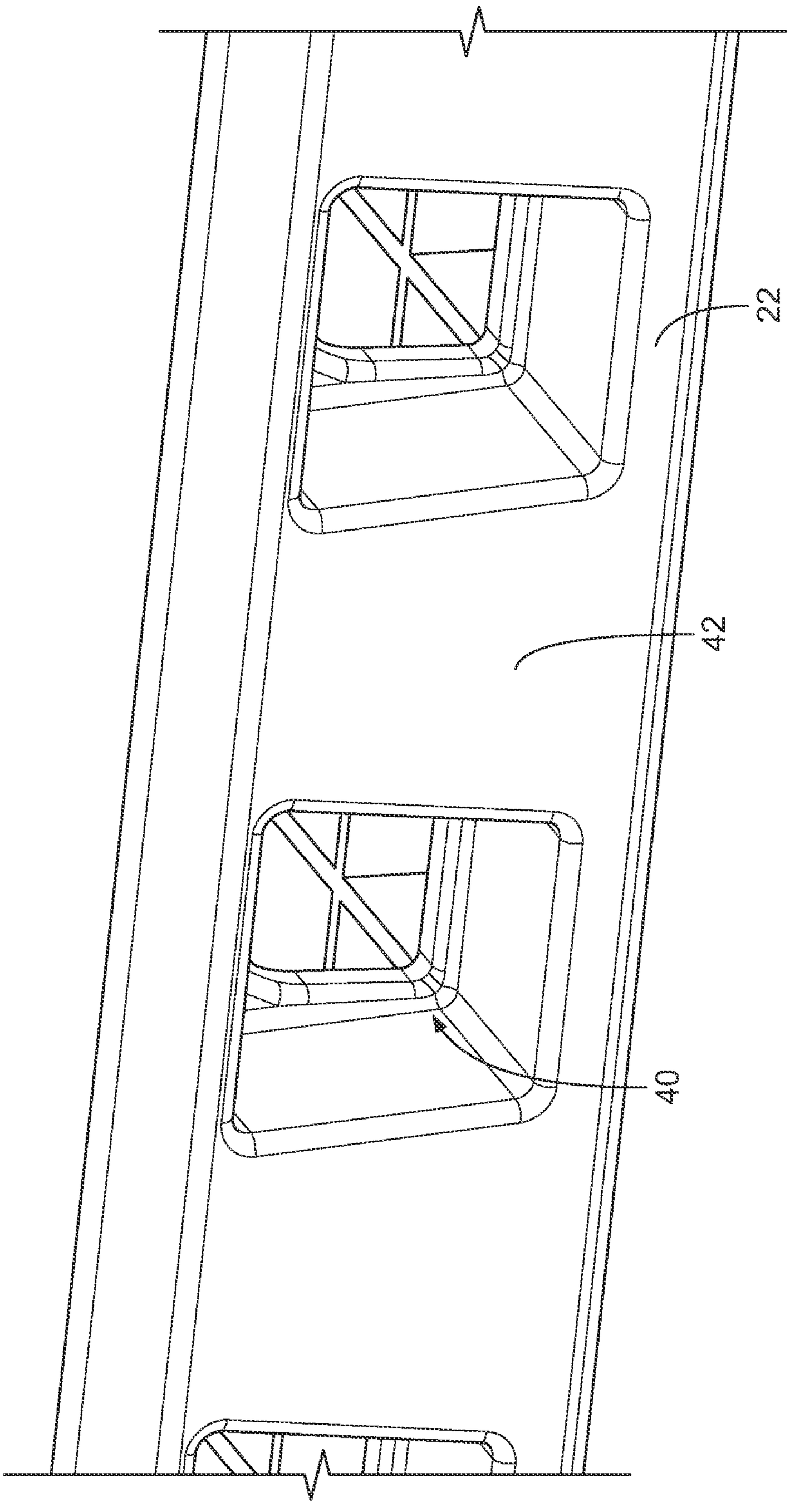

FIG. 5

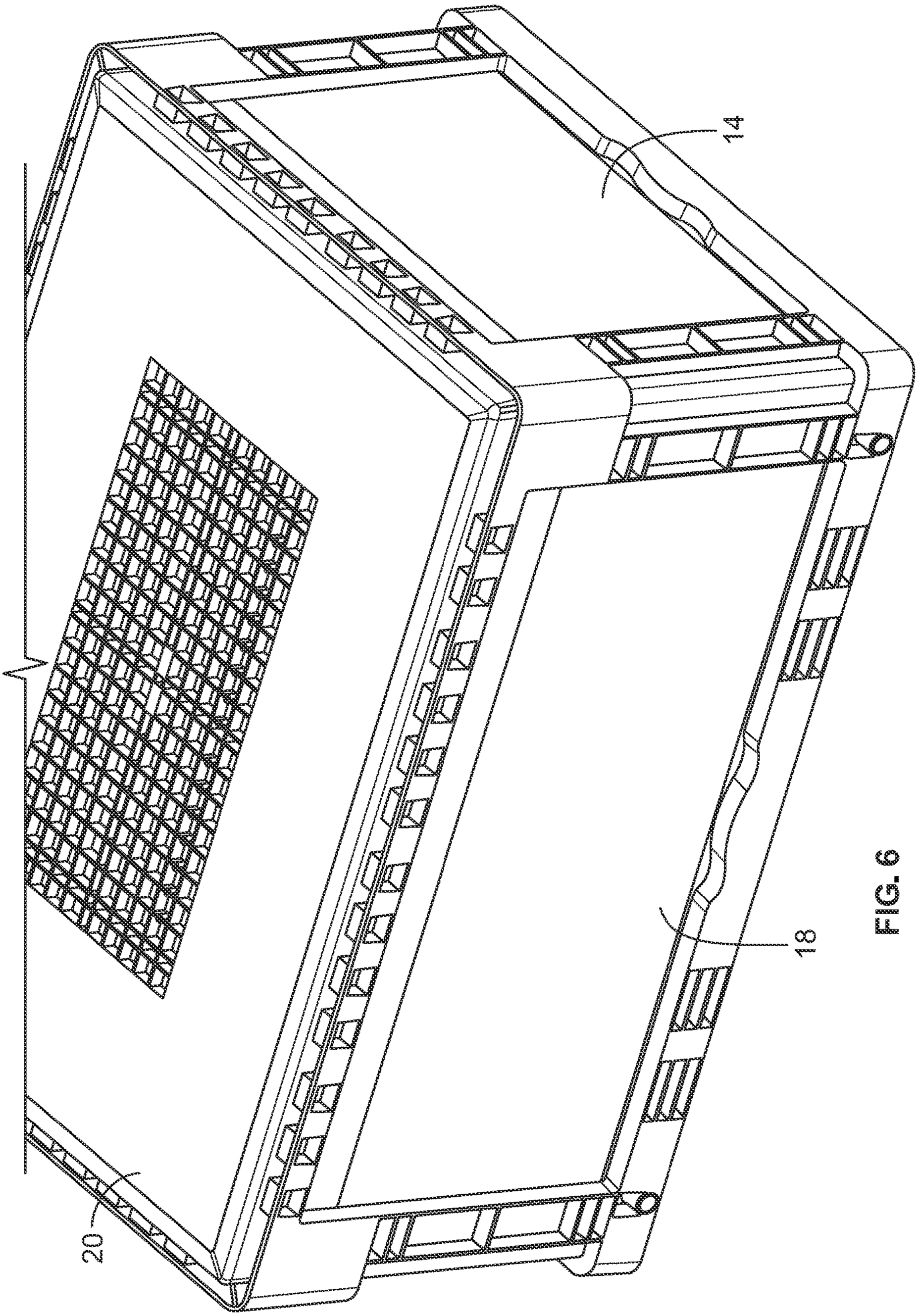

FIG. 6

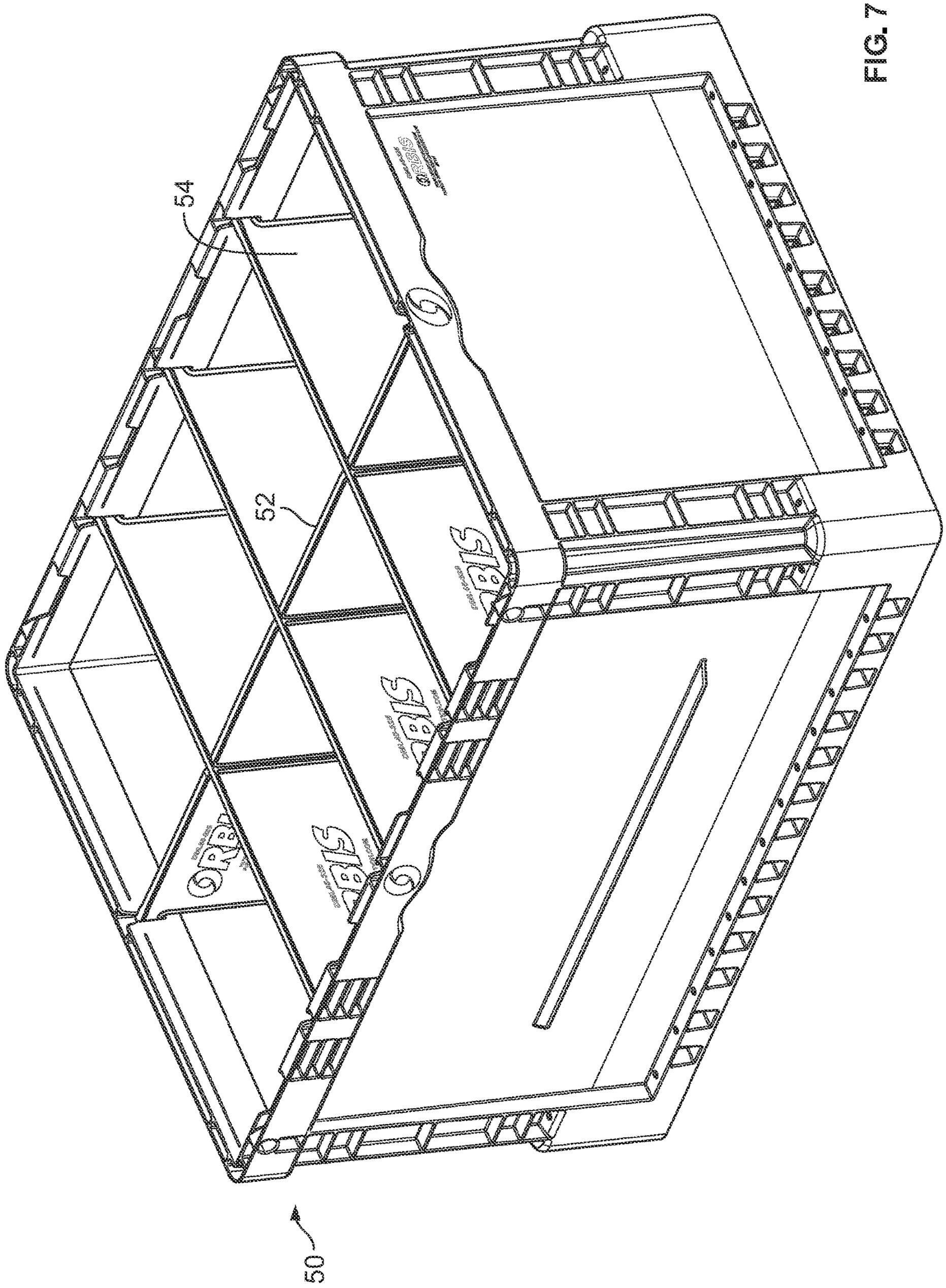

FIG. 7

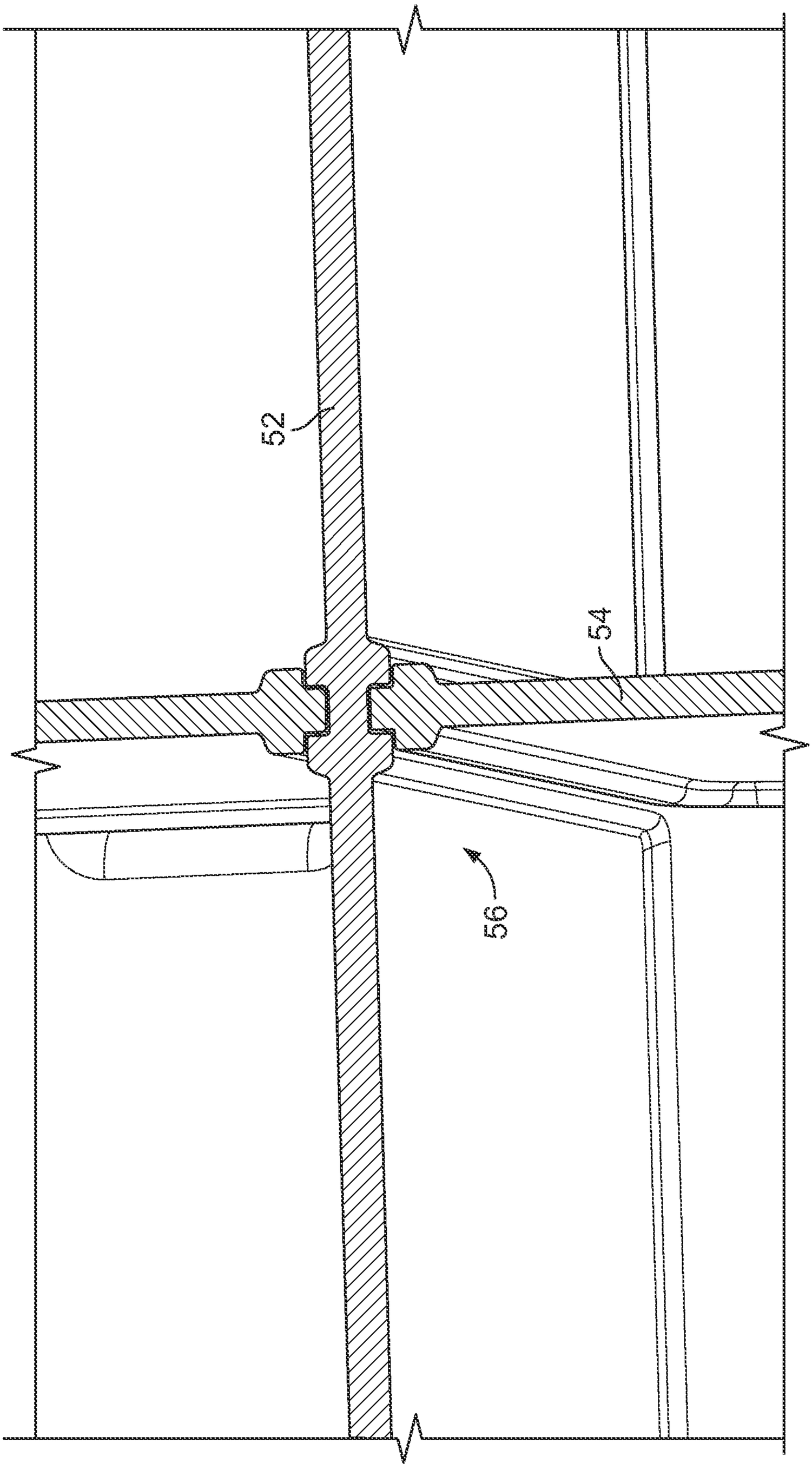

FIG. 8

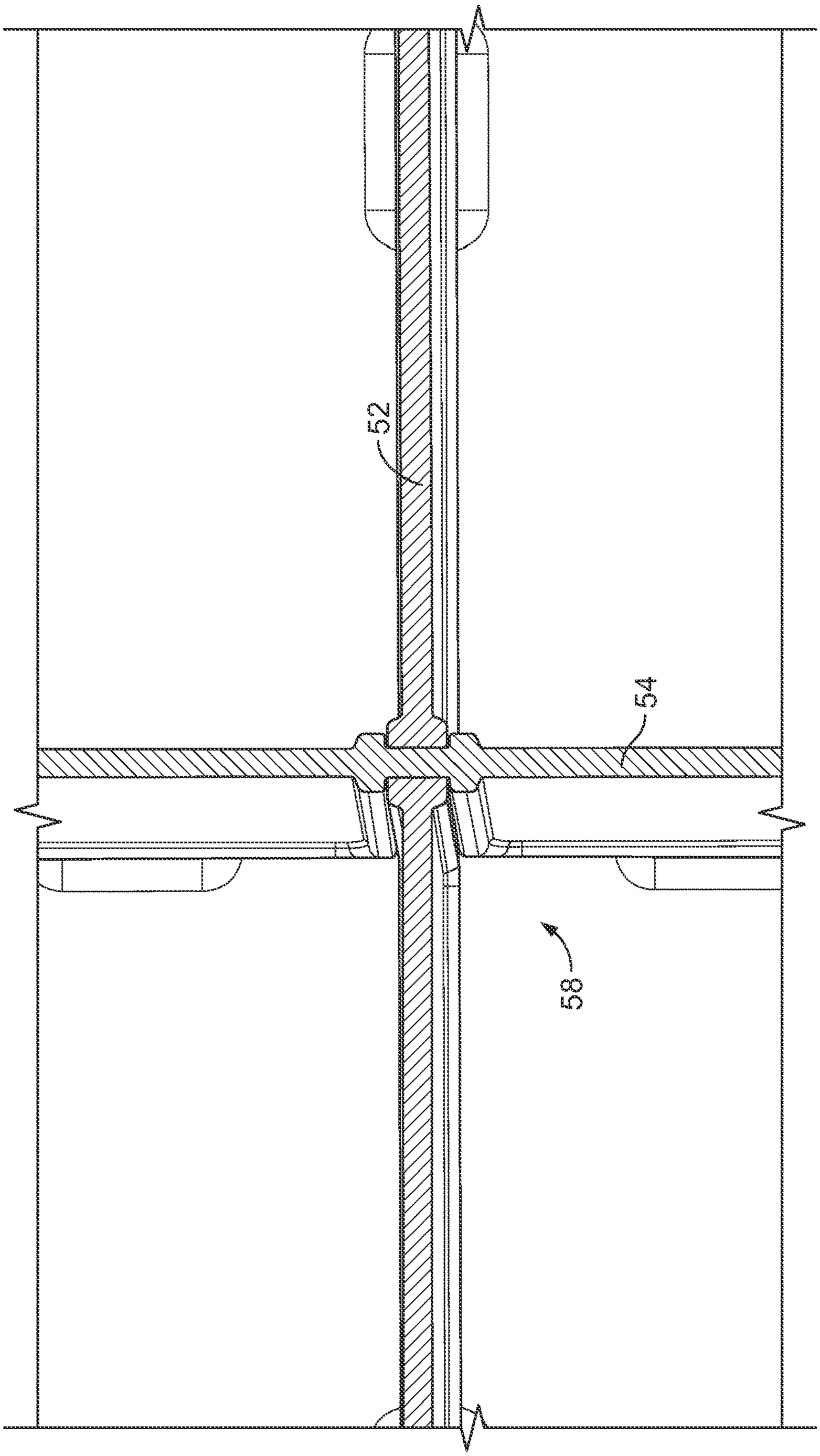

FIG. 9

TOTE WITH SIDE WALL DRAIN HOLES

CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention claims priority to and the benefit of U.S. Provisional Patent Application Nos. 63/265,598 filed Dec. 17, 2021 and 63/265,452 filed Dec. 15, 2021, the contents of which are incorporated herein by reference and made a part hereof.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

N/A

FIELD OF THE INVENTION

The present invention is generally directed to a drainage system for a tote, and more particularly, to a tote having a plurality of drain holes in the end and side walls configured to allow drainage of liquid through a bumper on the lower portion of the walls.

DESCRIPTION OF THE PRIOR ART

Totes and other similar containers are a primary packaging product used in the industry to distribute a wide array of products. The totes are typically used in a returnable loop automatic storage and retrieval system (ASRS) where they are used to fulfill orders for inventory.

When the totes are stored in an ASRS system it's required that water is not retained in the tote during a fire detection incident where the sprinklers would be activated. Typically, totes used in this type of application usually have drain holes in the sides and/or bottom that are very simplistic and do not optimize water dispersion. An excess accumulation of water in the tote can also cause racking failures due to weight buildup of water within the totes.

The present invention provides a design to optimize evacuation of water during a fire suppression occurrence. In the new design, water is forced to accumulate in the bottom of the tote before draining out all four sides in an evenly distributed pattern.

SUMMARY OF THE INVENTION

The present invention is generally directed to a drainage system for a tote to allow even flow of a liquid in the interior of the tote. The system includes a plurality of drain holes in the walls of the tote spaced a first distance above the surface of the bottom wall. The drain holes are configured to allow the flow of any liquid in the interior of the container out through a bumper extending around the outer periphery of the tote. The system requires first allowing the liquid to accumulate in the bottom of the tote before evenly exiting the tote through the drain holes and bumper. The drain holes are configured to have a D-shaped opening (on its side) to facilitate the even flow of the liquid through all sides of the bumper and out past the foot print of the tote.

Specifically, in accordance with the design of the present invention, water is forced to accumulate in the bottom of the tote before draining out the sides in an evenly distributed pattern while not exceeding more than about 0.50 inches of water within the tote at any given time. The drainage of water is forced out through the bumper and towards the outside of the tote perimeter, without allowing the water to drain back into stacked or placed totes below.

In accordance with one aspect of the invention, a tote with a drainage system for enabling even flow of liquid out of the tote is provided. The tote comprises a container body having a first end wall, an opposing second end wall, a first side wall and an opposing second side wall extending upwards from a bottom wall. A bumper extends outward from the first end wall, second end wall, first side wall and second side wall around a lower portion of the container body. At least a first drain hole is in the first end wall spaced a first distance above a top surface of the bottom wall allowing liquid from an interior of the container body to exit through the bumper. Similarly, at least a first drain hole is in the second end wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper, as well as a first drain hole is in the first side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper; and a first drain hole is in the second side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper. The tote is configured to accumulate liquid in a bottom portion of the container body below the first distance before drainage occurs.

The tote also includes a plurality of ribs extending upward from the top surface of the bottom wall. The plurality of ribs comprises a plurality of spaced apart parallel ribs extending from proximate the first end wall to proximate the second end wall, and a plurality of spaced apart parallel ribs extending from proximate the first side wall to proximate the second side wall. The ribs form a grid like pattern on the bottom wall. The ribs are configured to extend upward a second distance that is less than the first distance.

The tote can be designed such that the first distance is 0.5 inches and the second distance is 0.45 inches. With these measurements, the ribs will completely fill with any liquid in the container body (e.g., water) before being drained through the drain holes.

The first end wall can include a second drain hole spaced the first distance above the top surface, or more for allowing liquid from the interior of the container body to exit through the bumper. Similarly, the second end wall, first side wall and second side wall can also a second drain hole spaced the first distance above the top surface, or more for allowing liquid from the interior of the container body to exit through the bumper.

Each of the drain holes can have a D-shaped opening. In this instance, the opening can have a flat segment and an arcuate segment connected at a first end to a first end of the flat segment and at a second end to a second end of the flat segment. The flat segment can be oriented to a horizontal position with the arcuate segment above the flat segment.

The bumper can include a first horizontal upper wall extending outward from the container body and a second lower horizontal wall extending outward from the container body. The drain holes can be positioned between the first wall of the bumper and the second wall of the bumper. Additionally, the bumper can include a plurality of segments extending outwardly from the container body between the drain holes.

In accordance with another aspect of the invention, a tote having a drainage system is provided. The tote comprises a container body having a first end wall, an opposing second end wall, a first side wall and an opposing second side wall extending upwards from a bottom wall. A bumper extends outward from the first end wall, second end wall, first side

wall and second side wall around a lower portion of the container body. A first plurality of drain holes are in the first end wall spaced a first distance above a top surface of the bottom wall allowing liquid from an interior of the container body to exit through the bumper. A second plurality of drain holes are in the second end wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper. A third plurality of drain holes are in the first side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper and a fourth plurality of drain holes are in the second side wall spaced the first distance above the top surface. The drain holes allow liquid from the interior of the container body to exit through the bumper. The tote is configured to accumulate liquid in a bottom portion of the container body below the first distance before drainage occurs. The drain holes and bumper can be configured as noted.

The tote can be formed from a molded plastic. Other similar or suitable materials can also be used.

Other features and advantages of the invention will be apparent from the following specification taken in conjunction with the following Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

To understand the present invention, it will now be described by way of example, with reference to the accompanying drawings in which:

FIG. **1** is a perspective view of a tote with a drainage system in accordance with the present invention;

FIG. **2** is a partial perspective view of a lower interior portion of the tote of FIG. **1**;

FIG. **3** is a partial perspective cross-sectional view of a lower interior portion of the tote of FIG. **1**;

FIG. **4** is a partial perspective cross-sectional view of a lower exterior and interior portion of the tote of FIG. **1**

FIG. **5** is an enlarged partial perspective view of an exterior portion of the bumper of the tote of FIG. **1**;

FIG. **6** is a perspective upside down view of the tote of FIG. **1**;

FIG. **7** is a perspective view of a container in accordance with the present invention having a drainage system in accordance with the present invention and intersecting divider panels with features for locking the panels along the length of the intersections between matching half slots in the divider panels;

FIG. **8** is an enlarged cross-sectional view of a lower portion of the intersection; and,

FIG. **9** is an enlarged cross-sectional view of an upper portion of the intersection.

DETAILED DESCRIPTION

While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to the embodiments illustrated.

FIGS. **1-6** show aspects of an embodiment of a tote **10** with a drainage system for allowing a liquid to drain out evenly from an interior of the tote in accordance with the present invention. The tote **10** is in the form of a unitary container body having a first end wall **12**, a second end wall **14** opposing the first end wall **12**, a first side wall **16** and a second side wall **18** opposing the first side wall **16**. All of the walls **12**, **14**, **16**, **18** extend upward from a generally rectangular bottom wall **20**.

The container body includes a bumper **22** extending continuously around a bottom portion of each of the end and side walls **12**, **14**, **16**, **18**. The bumper **22** extends outward from the walls **12**, **14**, **16**, **18**, and includes a top horizontal wall **24** and a bottom horizontal wall **26** having a downwardly directed lip **28** as shown in FIG. **3**. The top horizontal wall **24** is spaced a distance above the bottom horizontal wall **28**.

The container body also includes a plurality of drain holes **30** positioned proximate the bottom of each of the end and side walls **12**, **14**, **16**, **18**. The drain holes **30** are positioned a first distance above a top surface of the bottom wall **20**. In the embodiment illustrated, the bottom of each drain hole **30** is about 0.50 inches from the top surface of the bottom wall **20**. This distance aligns the drain holes **30** so that they are in between the top horizontal wall **24** and the bottom horizontal wall **26** of the bumper **22** as shown, for example, in FIG. **3**.

The bottom wall **20** of the tote includes a plurality of ribs **32**, **34** extending upward from the top surface of the bottom wall **20**. A first set of the ribs **32** are generally parallel to each other and extend from proximate the first end wall **12** to proximate the second end wall **14**, and a second set of the ribs **34** are generally parallel to each other and extend from proximate the first side wall **16** to proximate the second side wall **18**. This forms a grid pattern on the bottom wall **20**. The ribs extend upward a second distance that is slightly less than the bottom of the drain holes **30**. In the embodiment shown the ribs extend upward approximately 0.45 inches. In view of these dimensions, the ribbed portion of the bottom wall **20** will completely fill with any liquid (e.g., water) before allowing the liquid to drain evenly through the drain holes **30** and out through the bumper **22**.

The drain holes **30** are formed to have a D-shaped opening (with the D-shape on its side). Each drain hole **30** includes a flat segment **36** connected at each end to an end of an arcuate shaped segment **38**.

The bumper **22** is designed to include openings **40** that are aligned with the drain holes **30**. The openings **40** have a generally trapezoidal shape. Segments **42** extending between the top horizontal wall **24** and the bottom horizontal wall **26** are formed between adjacent drain holes **30** and openings **40** in the bumper **22**.

The tote is preferably formed from a molded plastic, or other similar or suitable materials.

Directional words such as top, bottom, upper etc. are used herein to describe the invention as shown in the drawings and as typically used, and are not meant to limit the invention to being in such positions.

FIG. **7** discloses a container **50** having a drainage system in accordance with the present invention. Additionally, the container includes divider panels **52**, **54** having structure at the intersections for preventing the upper or lower portions of the walls of the panels **52**, **54** from flexing due to a load as provided in U.S. Provisional Patent Application No. 63/265,452 filed Dec. 15, 2021. FIG. **8** shows a cross-sectional view of the structure **56** for the lower portion of an intersection and FIG. **9** shows a cross-sectional view of the structure **58** of the upper portion of the intersection (the intersections are formed from corresponding half slots in each divider panel).

Many modifications and variations of the present invention are possible in light of the above teachings. It is,

therefore, to be understood within the scope of the appended claims the invention may be protected otherwise than as specifically described.

I claim:

1. A tote with a drainage system for enabling even flow of liquid comprising:

a container body having a first end wall, an opposing second end wall, a first side wall and an opposing second side wall extending upwards from a bottom wall;

a bumper extending outward from the first end wall, second end wall, first side wall and second side wall around a lower portion of the container body, the bumper having a bottom horizontal wall and a top horizontal wall spaced a distance above the bottom horizontal wall;

a first drain hole in the first end wall spaced a first distance above a top surface of the bottom wall allowing liquid from an interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall;

a first drain hole in the second end wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall;

a first drain hole in the first side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall; and,

a first drain hole in the second side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall, wherein the tote is configured to accumulate liquid in a bottom portion of the container body below the first distance before drainage occurs.

2. The tote of claim **1** further comprising a plurality of ribs extending upward from the top surface of the bottom wall.

3. The tote of claim **2** wherein the plurality of ribs comprises a plurality of spaced apart parallel ribs extending from proximate the first end wall to proximate the second end wall.

4. The tote of claim **3** wherein the plurality of ribs comprises a plurality of spaced apart parallel ribs extending from proximate the first side wall to proximate the second side wall.

5. The tote of claim **2** wherein each of the plurality of ribs extends upward a second distance that is less than the first distance.

6. The tote of claim **5** wherein the first distance is 0.5 inches.

7. The tote of claim **6** wherein the second distance is 0.45 inches.

8. The tote of claim **2** wherein the first end wall includes a second drain hole spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper.

9. The tote of claim **8** wherein the second end wall includes a second drain hole spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper.

10. The tote of claim **9** wherein the first side wall includes a second drain hole spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper.

11. The tote of claim **10** wherein the second side wall includes a second drain hole spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper.

12. The tote of claim **11** wherein each of the drain holes is D-shaped having a flat segment and an arcuate segment connected at a first end to a first end of the flat segment and at a second end to a second end of the flat segment.

13. The tote of claim **12** wherein the flat segment is oriented to a horizontal position with the arcuate segment above the flat segment.

14. The tote of claim **11** wherein the bumper includes a first horizontal upper wall extending outward from the container body and a second lower horizontal wall extending outward from the container body and wherein the drain holes are between the first wall of the bumper and the second wall of the bumper.

15. The tote of claim **14** wherein the bumper includes a plurality of segments extending outwardly from the container body between the drain holes.

16. The tote of claim **1** wherein the tote is formed from plastic.

17. A tote having a drainage system comprising:

a container body having a first end wall, an opposing second end wall, a first side wall and an opposing second side wall extending upwards from a bottom wall;

a bumper extending outward from the first end wall, second end wall, first side wall and second side wall around a lower portion of the container body, the bumper having a bottom horizontal wall and a top horizontal wall spaced a distance above the bottom horizontal wall;

a first plurality of drain holes in the first end wall spaced a first distance above a top surface of the bottom wall allowing liquid from an interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall;

a second plurality of drain holes in the second end wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall;

a third plurality of drain holes in the first side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall; and,

a fourth plurality of drain holes in the second side wall spaced the first distance above the top surface allowing liquid from the interior of the container body to exit through the bumper between the bottom horizontal wall and the top horizontal wall, wherein the tote is configured to accumulate liquid in a bottom portion of the container body below the first distance before drainage occurs.

18. The tote of claim **17** wherein each of the drain holes is D-shaped having a flat segment and an arcuate segment connected at a first end to a first end of the flat segment and at a second end to a second end of the flat segment.

19. The tote of claim **18** wherein the bumper includes a first horizontal upper wall extending outward from the container body and a second lower horizontal wall extending outward from the container body and wherein the drain

holes are between the first wall of the bumper and the second wall of the bumper.

20. The tote of claim **18** wherein the tote is formed from plastic.

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